Shapes Modeling Based on Mouse Mouth Cavity.

(Science Communication)

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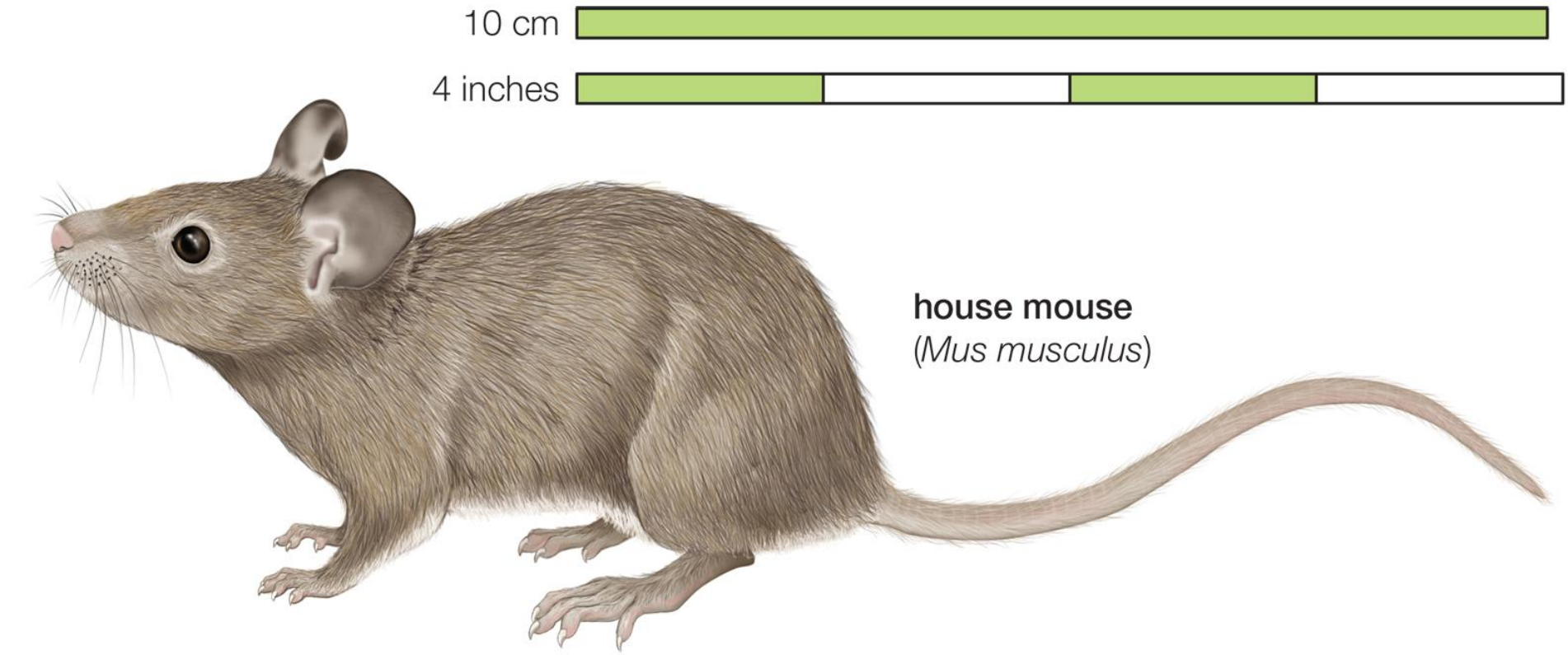
mouse, (genus Mus), the common name generally but imprecisely applied to rodents found throughout the world with bodies less than about 12 cm (5 inches) long. In a scientific context, mouse refers to any of the 38 species in the genus Mus, which is the Latin word for mouse. The house mouse (Mus musculus), native to Central Asia, has established itself with human populations in many other parts of the world.



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Shape Modeling Based on Bio-inspiration

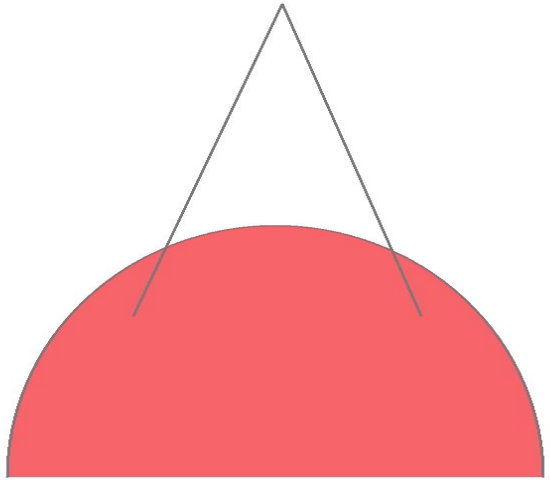
- Shapes do form everyday and everywhere.
- Bio-inspired shapes are forming right now.
- Try not think too much about it.
- What does mouse or rat has to offer?

Shape Processing

- These shapes are processed by processing Java library. processing.org
- Codes for the shape processing will be in the appendix.
- Java Programming is required.
- Shapes include line, arc and rectangle.

Processing Shapes

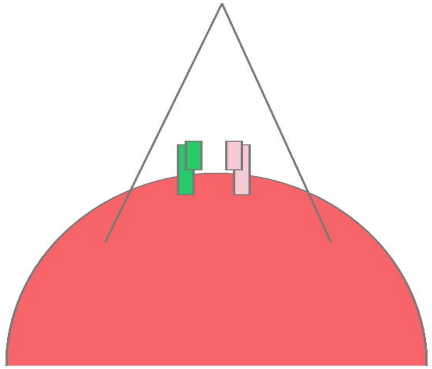
Shape Processor 1



Draw Lines

Draw Arc

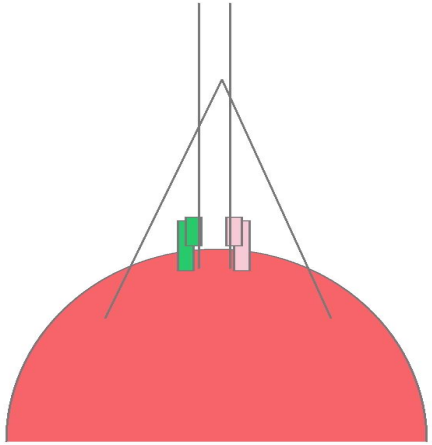
Processor 2



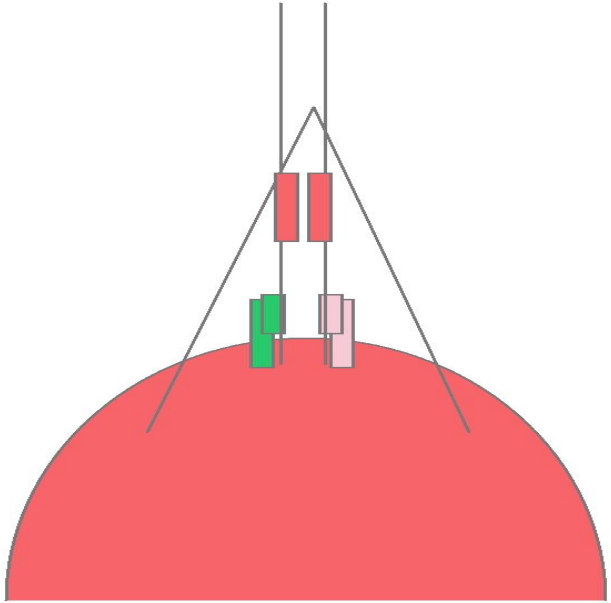
Draw Lines

Draw Rect
Draw Arc

Processor 3



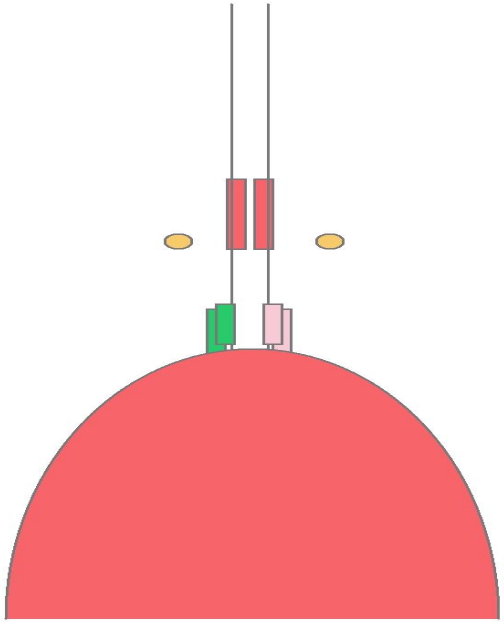
Draw Lines
Draw Carrotstick
Draw Rect
Draw Arc



Shape Processor 4

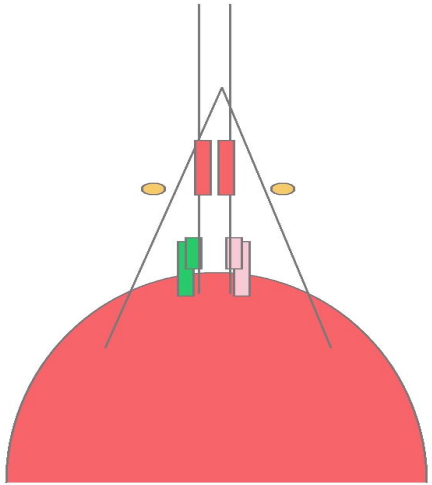
Draw Lines
Draw Carrotstick
Draw Carrot
Draw Rect
Draw Arc

Processor 5

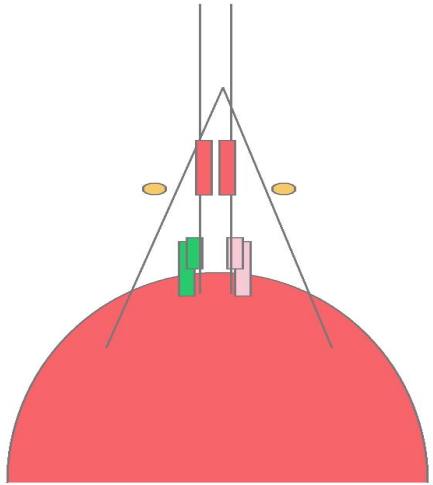


Draw Balls
Draw Carrotstick
Draw Carrot
Draw Rect
Draw Arc

Processor 6: Shape Group.



Draw Lines
Draw Balls
Draw Carrotstick
Draw Carrot
Draw Rect
Draw Arc



Draw Lines
Draw Balls
Draw Carrotstick
Draw Carrot
Draw Rect
Draw Arc

Final Diagram : Code Snippet

```
void setup() {
  drawArc();// key=A
  drawArcRect();// key=R
  drawCarrot();// key=C
  drawCarrotSticks();// key=S
  drawBalls();// key=B
  drawLines();// key=L
}
```

Draw Arc Method

```
void drawArc() {
  grp = createShape(GROUP);
  fill(color(245, 100, 111));
  ark= createShape(ARC, (width/2-width/4)-130,
(height/2-height/4)+180, width/2, height/2, PI, 2*PI);
  grp.addChild(ark);//right rect1/2
}
```

Draw Arc Rectangular Method

```
void drawArcRect() {

  fill(color(245, 200, 211));
  rect1=createShape(RECT, (width/2-width/60)-80, (height/2-height/9)-130, 10, 70,
2);//Bottom
  grp.addChild(rect1);
  rect2=createShape(RECT, (width/2-width/60)-90, (height/2-height/9)-170, 10, 40, 2);//Top
  grp.addChild(rect2);//left rect1/2
  fill(color(45, 200, 111));
  rect1=createShape(RECT, (width/2-width/60)-152, (height/2-height/9)-130, 10, 70,
2);//Bottom
  grp.addChild(rect1);
  rect2=createShape(RECT, (width/2-width/60)-142, (height/2-height/9)-170, 10, 40, 2);//Top
  grp.addChild(rect2);
}
```

Draw Carrot Method

```
void drawCarrot() {
  //rect line 1/2
  fill(color(245, 100, 111));
  rect=createShape(RECT, (width/2-width/60)-130,
(height/2-height/6)-270, 10, 70, 2);//LeftBottom
  grp.addChild(rect);
  rect=createShape(RECT, (width/2-width/60)-100,
(height/2-height/6)-270, 10, 70, 2);//RightTop
  grp.addChild(rect);
}
```

Draw Carrot Sticks Method

```
void drawCarrotSticks() {
  //lines 1/2
  line=createShape(LINE, (width/2-width/60)-135, 30,
(width/2-width/60)-135,
(height/2-height/60)-270);//LeftBottom Line
  grp.addChild(line);
  line=createShape(LINE, (width/2-width/60)-95, 30,
(width/2-width/60)-95, (height/2-height/60)-270);//RightTop
Line
  grp.addChild(line);
}
```

Draw Balls Method

```
void drawBalls() {
  fill(color(245, 200, 111));
  cir1= createShape(ARC, (width/2-width/60)-208,
(height/2-height/6)-230, 30, 30, 0, 2*PI);//Left Circle
  grp.addChild(cir1);
  cir1= createShape(ARC, (width/2-width/60)-42,
(height/2-height/6)-230, 30, 30, 0, 2*PI);//Right Circle
  grp.addChild(cir1);
}
```

Draw Lines Method

```
void drawLines() {
  stroke(123);
  strokeWeight(3);
  line=createShape(LINE, (width/2-width/60)-255, (height/2-height/60)-130,
(width/2-width/60)-105, (height/2-height/60)-800);//LeftBottom Line
  grp.addChild(line);
 line=createShape(LINE, (width/2-width/60)+35, (height/2-height/60)-130,
(width/2-width/60)-105, (height/2-height/60)-800);//RightTop Line
 grp.addChild(line);
}
```

Draw Control Code

```
void draw() {

  if (drawArc){
    clear();
    drawArc();// key=A
    text("Draw Arc", 50,height-70) ;
  }
  else if (drawArcRect){
    clear();
    drawArcRect();// key=R
    text("Draw Rect", 50,height-100) ;
  }
  else if (drawCarrot){
    clear();
    drawCarrot();// key=C
    text("Draw Carrot", 50,height-130) ;
  }
```

Continue.

```
else if (drawCarrotSticks){
   clear();
   drawCarrotSticks();// key=S
   text("Draw Carrotstick", 50,height-160) ;
 }
 else if (drawBalls){
   clear();
   drawBalls();// key=B
   text("Draw Balls", 50,height-190) ;
 }
```

Continue..

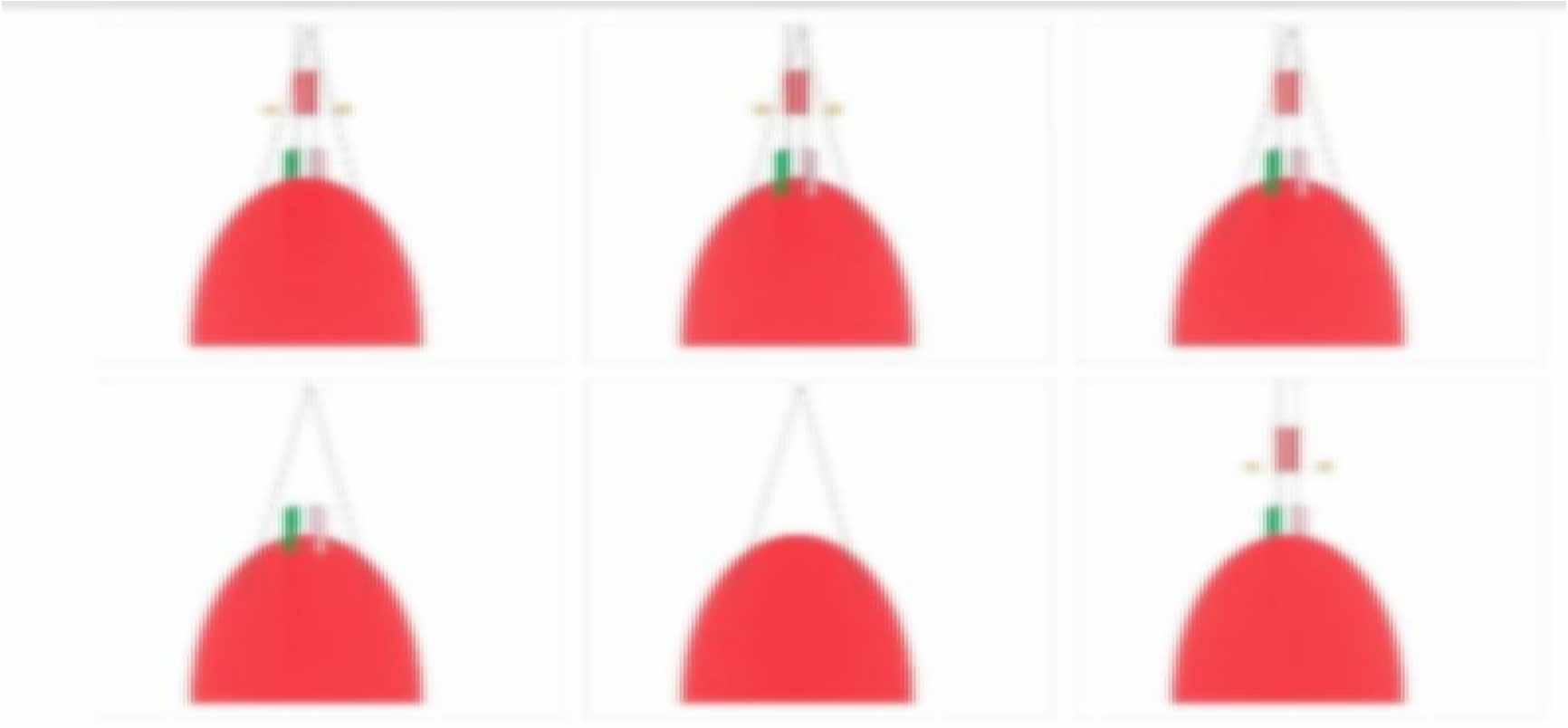
```
else if (drawLine){
    clear();
    drawLines();// key=L
    text("Draw Lines", 50,height-220) ;
  }
  else{
    clear();
    createMousetch();
  }
  shape(grp, width/6-100, height/6-50);
}
```

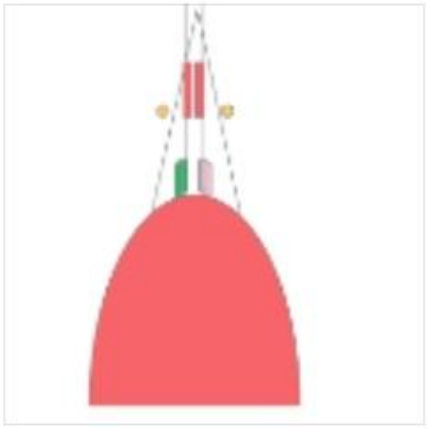
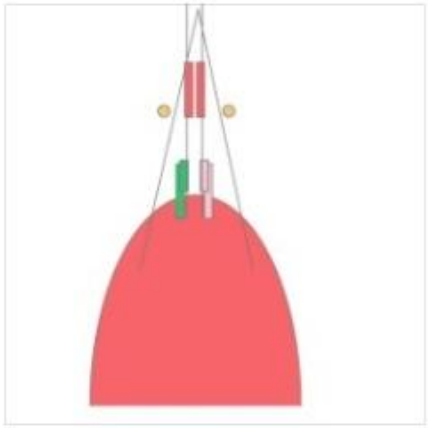
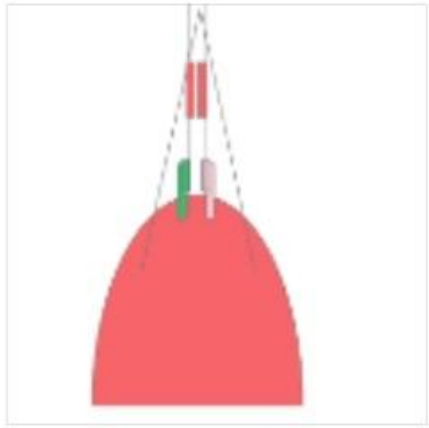
Key Handling

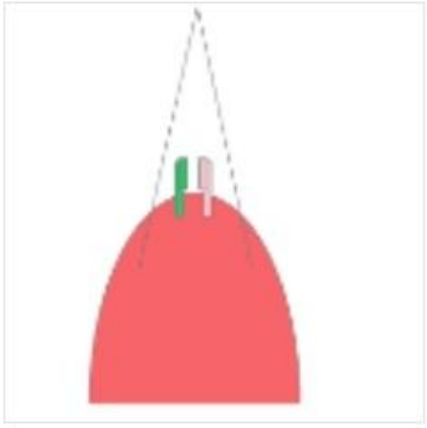
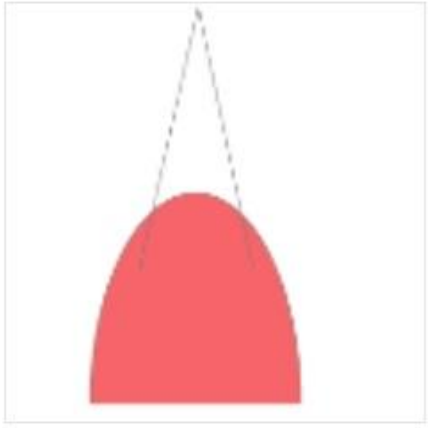
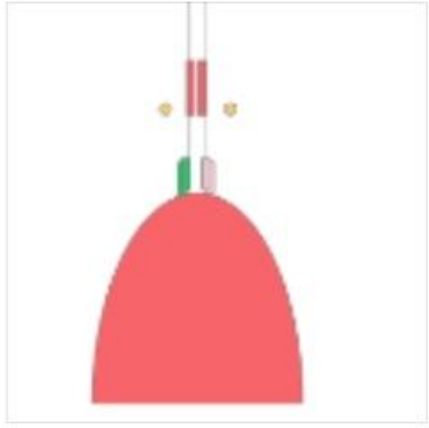
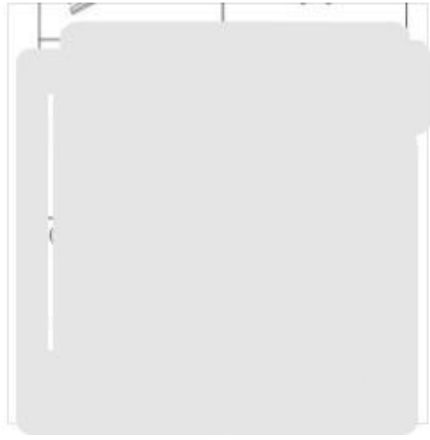
Boolean Variables.

```
drawArc=true;
drawArcRect=false;
drawCarrot=false;
drawCarrotSticks=false;
drawBalls=false;
drawLine=false;
```

Bio-inspired Shape Processing



Engineering Application

Metal Contacts With Electron Flow / Current Flow

- Possiblly in metal contact formation
- Possibly in heat transfer with the red base arc.
- Possibly in magnetic field contact

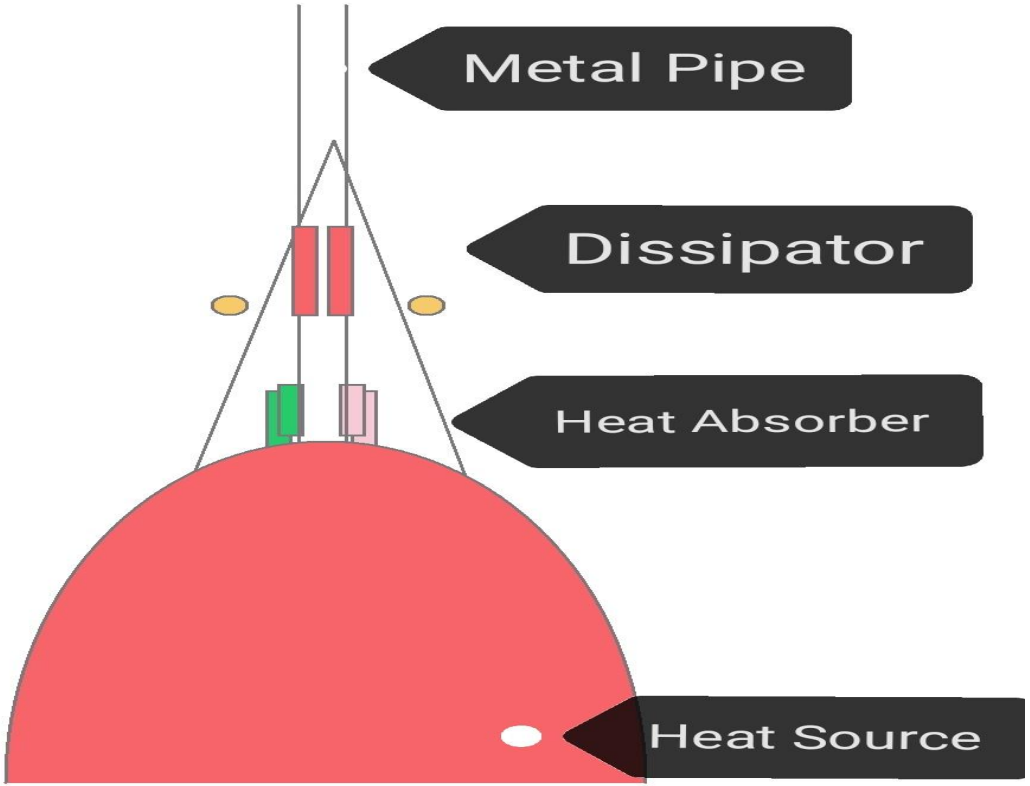
Half-metal contact versus Full-metal contact

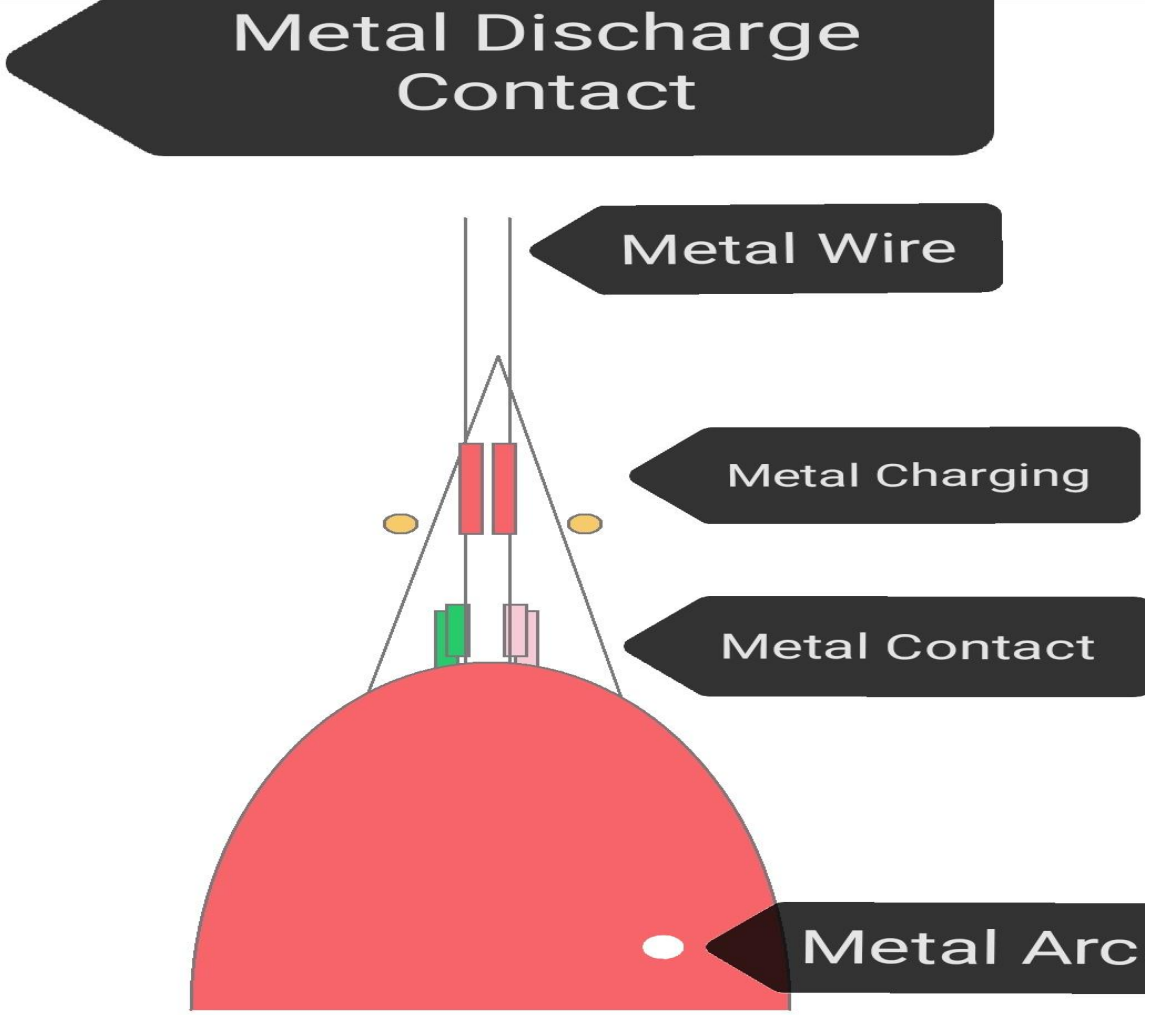
Idea to assess the merit of half-arc metal contact against full-arc metal contact.

- Half-arc at 0 degrees to 180 degrees
- Full-arc at 0 degrees to 360 degrees.
- What about 0 to 90 degrees contact?
- What about n- doping at 0-180 degrees to p+ doping at 181 to 360 degrees?
- What about quantum dots?

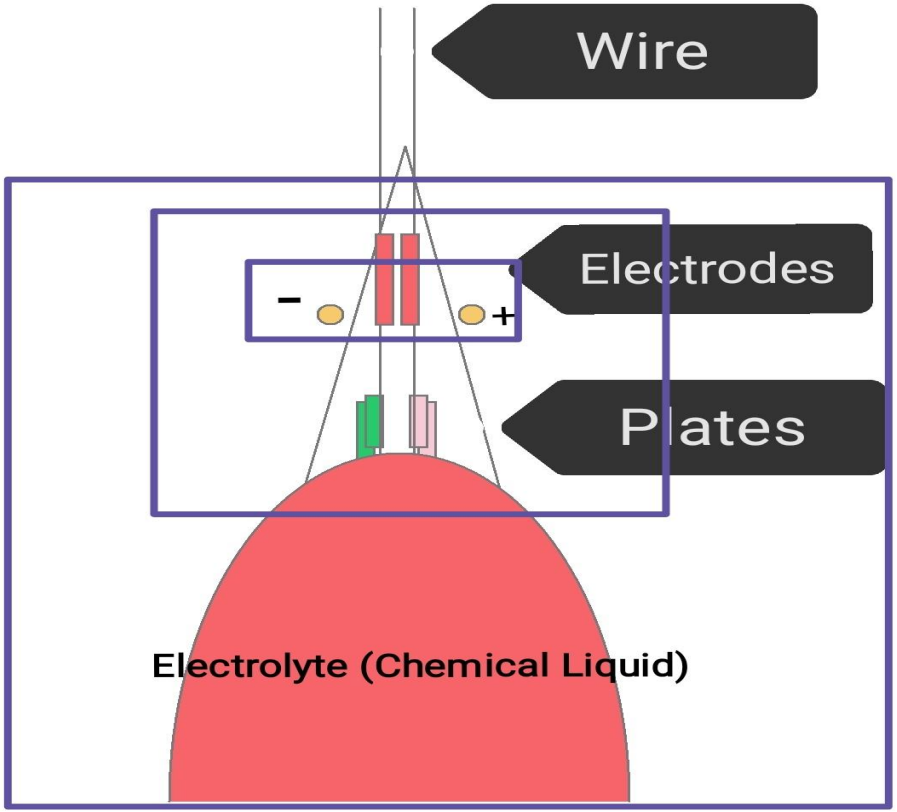
Bio-inspired Design

Heat Transfer

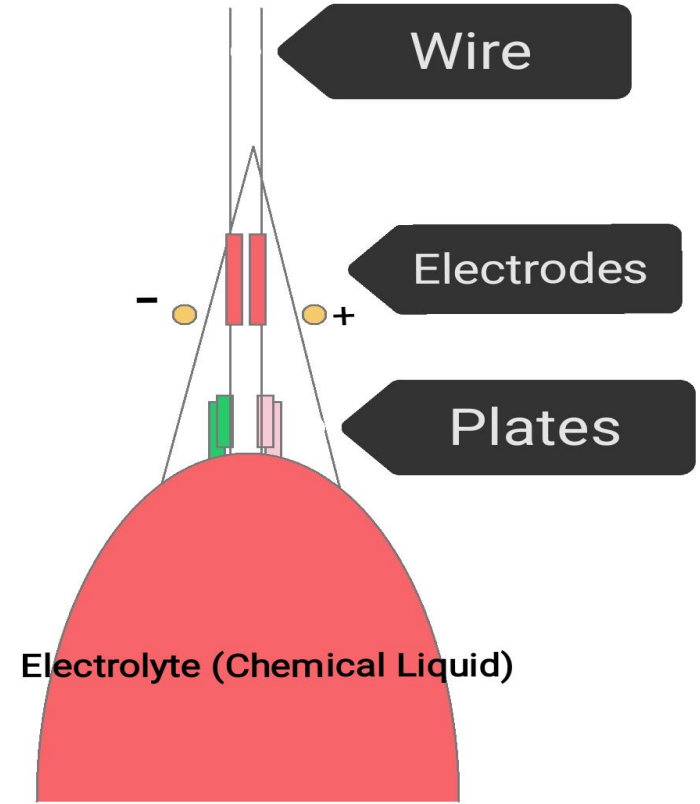



Metal Discharge Contact
Metal Wire
Metal Charging
Metal Contact
Metal Arc

Electric Capacitor Equivalent Circuit

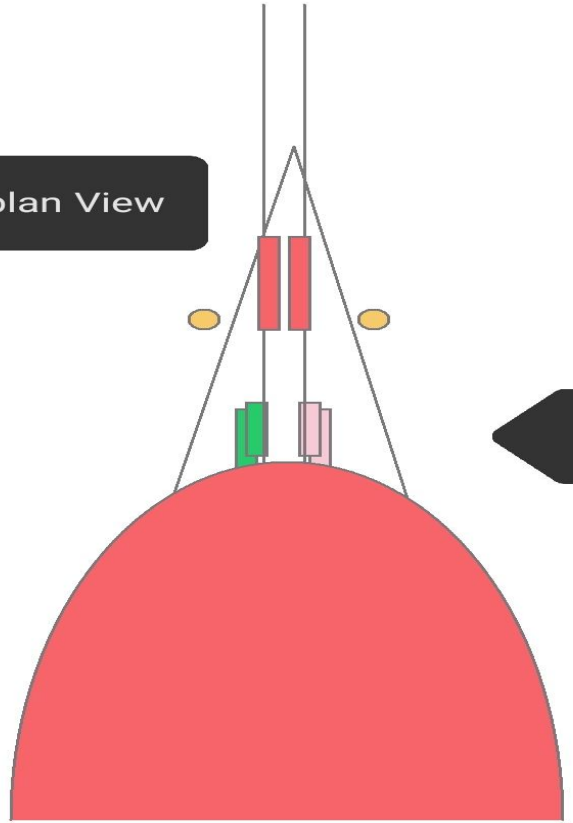


Electric Capacitor Equivalent Circuit



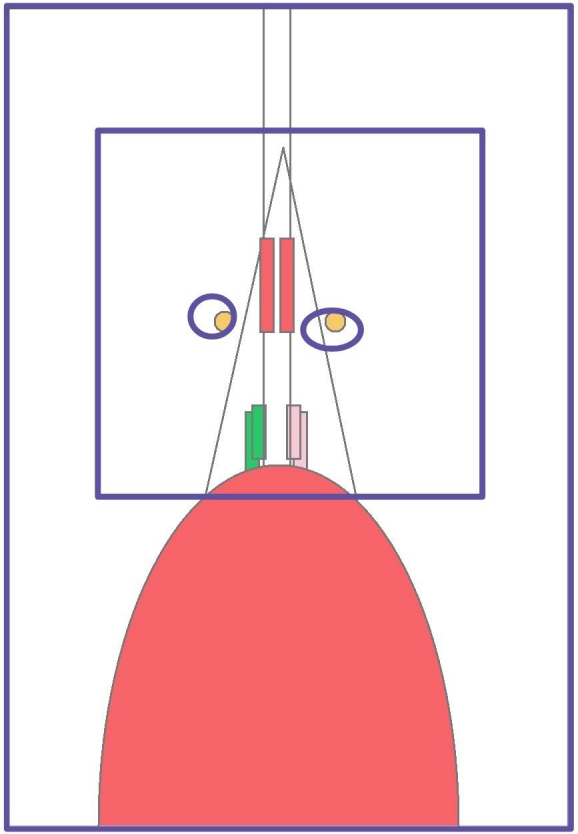
Building Architecture

1. Floorplan View



2. Eye Perspective

Laboratory
Container



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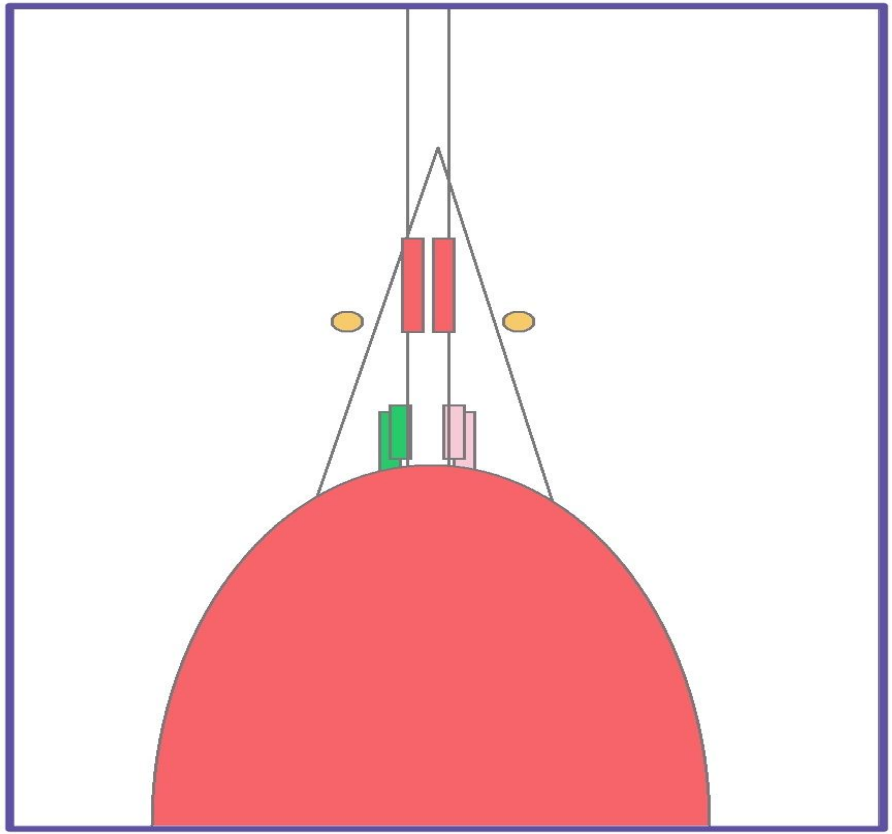
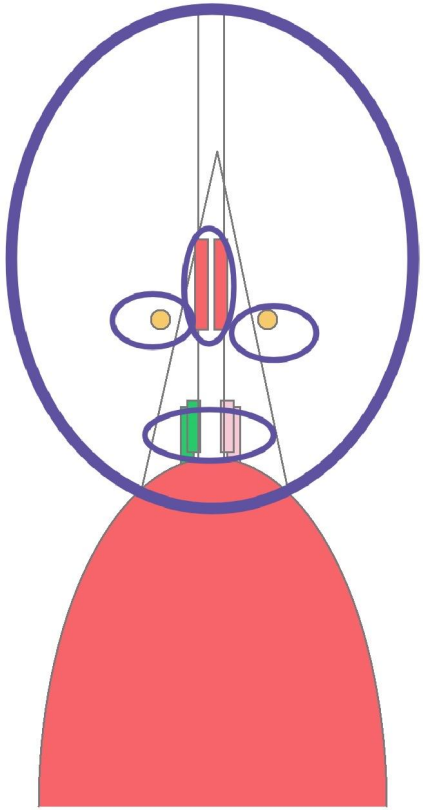


Creature in Film / Robot Face



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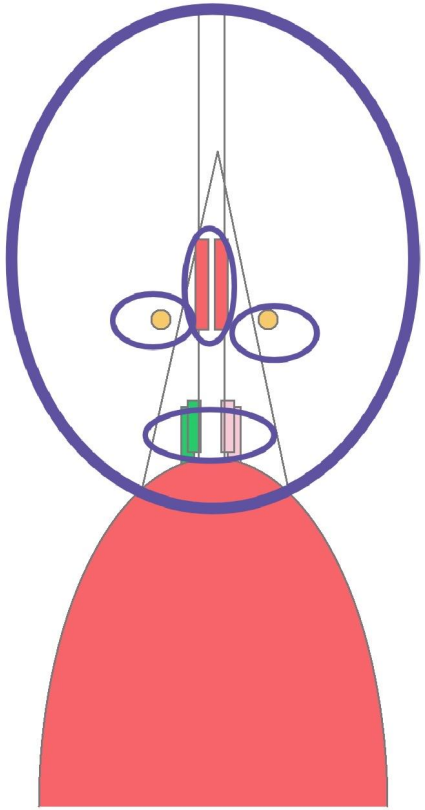

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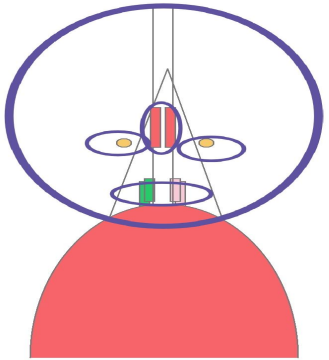

Funny

End. Thank you.

Email: appiahnsiahfrank@gmail.com

Any errors here are my own only and any omissions can be communicated via email anytime.

Bio-inspired Shape Processing

Frank Appiah, MIT Science Communication.